

Scientists of SibFU increased sensitivity of biosensor for analysis of water toxicity

Scientists of Siberian Federal University were able to increase the sensitivity of a biosensor, which is capable of analyzing water and food products for toxicity using gold nanoparticles says [TASS](#).



The main component of the biosensor, SibFU scientists work with, is a biomodule, which is an enzyme of luminous organisms. Under favorable conditions enzymes emit light, which are indicated by a special device — luminometer. However, this glow is reduced in the presence of toxic substances. According to the intensity of light emitted, scientists can assess the quality or safety of a product.



"But each system has its own limit: for example, it is impossible to determine very low concentrations of toxicants in the sample. Therefore, the idea of increasing the sensitivity of such a test with the help of gold nanoparticles was put forward. The light emitted during the enzymatic reaction meets nanoparticles and is reflected from them, but increased in dozens of times.

This phenomenon was called "the increase of bioluminescence by metals," said one of the authors of the study, a junior researcher at the laboratory of bioluminescent biotechnology at the University, **Maria Kirillova**.

In the experiments that were conducted in the laboratories of SibFU, scientists faced the problem of instability of gold nanoparticles, their coagulation, meaning adhesion. The lead author of the study, a member of the bioluminescent biotechnology laboratory Rajev Ranjan suggested covering the gold nanoparticles with a lipid mixture as a stabilizer. As a result, the proposed method worked.

"At present, the phenomenon of amplification of a light signal with the help of metal nanoparticles is actively studied all over the world, but more often the increase in fluorescence is investigated. There are not many works on the application of this method to enhance the luminescence of bioluminescent enzymes " said **Maria Kirillova**.

The scientists plan to apply the results to make a highly sensitive biosensor that will allow analysis of the toxicity of water and products purchased in supermarkets.

The paper is published in Journal of Nanoparticle Research. Along with Rajev Ranjan and Maria Kirillova, the team includes representatives of SibFU and the Institute of Biophysics and the Institute of Physics of the KSC of the SB RAS: Elena Esimbekova, Sergey Zharkov and Valentina Kratasyuk.

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